ARCHIVE

for

RATIONAL MECHANICS

and

ANALYSIS

Edited by

C. TRUESDELL & J. SERRIN

Volume 75

SPRINGER-VERLAG
BERLIN · HEIDELBERG · NEW YORK
1980/81

The exclusive copyright for all languages and countries, including the right for photomechanical and any other reproductions, also in microform, is transferred to the publisher. Authors of this journal can benefit from library and photocopy fees collected by VG WORT if certain conditions are met. If an author lives in the Federal Republic of Germany or in West Berlin it is recommended that he contact Verwertungsgesellschaft WORT, Abteilung Wissenschaft, Goethestraße 49, D-8000 München 2, for detailed information.

Die in der Zeitschrift veröffentlichten Beiträge sind urheberrechtlich geschützt. Alle Rechte, insbesondere das der Übersetzung in fremde Sprachen, vorbehalten. Kein Teil dieser Zeitschrift darf ohne schriftliche Genehmigung des Verlages in irgendeiner Form – durch Fotokopie, Mikrofilm oder andere Verfahren – reproduziert oder in eine von Maschinen, insbesondere von Datenverarbeitungsanlagen, verwendbare Sprache übertragen werden.

Auch die Rechte der Wiedergabe durch Vortrag, Funk- und Fernsehsendung, im Magnettonverfahren oder ähnlichem Wege bleiben vorbehalten.

Fotokopien für den persönlichen und sonstigen eigenen Gebrauch dürfen nur von einzelnen Beiträgen oder Teilen daraus als Einzelkopien hergestellt werden. Jede im Bereich eines gewerblichen Unternehmens hergestellte oder benützte Kopie dient gewerblichen Zwecken gem. § 54 (2) UrhG und verpflichtet zur Gebührenzahlung an die VG WORT, Abteilung Wissenschaft, Goethestraße 49, D-8000 München 2, von der die einzelnen Zahlungsmodalitäten zu erfragen sind.

Autoren dieser Zeitschrift können unter gewissen Voraussetzungen in die Individualausschüttung von Mitteln aus der Bibliothektantieme und dem Fotokopieraufkommen mit einbezogen werden. Genaue Informationen erteilt die Verwertungsgesellschaft WORT, Abteilung Wissenschaft, Goethestraße 49, D-8000 München 2.

Springer-Verlag/Berlin Heidelberg New York
Printers: Universitätsdruckerei H. Stürtz AG, Würzburg
Printed in Germany – © Springer Verlag GmbH & Co. KG, Berlin Heidelberg 1980/81

EDITORIAL BOARD

S. ANTMAN
University of Maryland
College Park, Maryland

E. BOMBIERI
Institute for Advanced Study
Princeton

H. BREZIS
Université de Paris VI
4 Place Jussieu
Paris 5

B. D. COLEMAN
Carnegie-Mellon University
Pittsburgh, Pennsylvania

C. DAFERMOS
Brown University
Providence, Rhode Island

M. FEINBERG
University of Rochester
Rochester, New York

G. FICHERA
Accademia Nazionale dei Lincei
Roma

M. E. GURTIN
Carnegie-Mellon University
Pittsburgh, Pennsylvania

D. D. JOSEPH
University of Minnesota
Minneapolis

J. L. LIONS
Collège de France
Paris 5

J. B. McLEOD
Oxford University
Oxford, England

J. C. C. NITSCHE
University of Minnesota
Minneapolis

D. OWEN
Carnegie-Mellon University
Pittsburgh, Pennsylvania

M. M. SCHIFFER
Stanford University
California

J. SERRIN
University of Minnesota
Minneapolis

E. STERNBERG
California Institute of Technology
Pasadena, California

G. STRANG
Massachusetts Institute of Technology
Cambridge, Massachusetts

H. F. TIERSTEN
Rensselaer Polytechnic Institute
Troy, New York

R. A. TOUPIN
Watson Research Center
Yorktown Heights, New York

C. TRUESDELL
The Johns Hopkins University
Baltimore, Maryland

C.-C. WANG
Rice University
Houston, Texas

H. WEINBERGER
University of Minnesota
Minneapolis

W. O. WILLIAMS
Carnegie-Mellon University
Pittsburgh, Pennsylvania

Mechanicam vero duplicem Veteres constituerunt: Rationalem *quae per Demonstrationes accurate procedit, & Practicam. Ad practicam spectant Artes omnes Manuales, a quibus utique* Mechanica *nomen mutuata est. Cum autem Artifices parum accurate operari soleant, fit ut* Mechanica *omnis a* Geometria *ita distinguatur, ut quicquid accuratum sit ad* Geometriam *referatur, quicquid minus accuratum ad* Mechanicam. *Attamen errores non sunt Artis sed Artificum. Qui minus accurate operatur, imperfectior est Mechanicus, & si quis accuratissime operari posset, hic foret Mechanicus omnium perfectissimus.* NEWTON

La généralité que j'embrasse, au lieu d'éblouïr nos lumieres, nous découvrira plutôt les véritables loix de la Nature dans tout leur éclat, & on y trouvera des raisons encore plus fortes, d'en admirer la beauté & la simplicité. EULER

... ut proinde his paucis consideratis tota haec materia redacta sit ad puram Geometriam, quod in physicis & mechanicis unice desideratum. LEIBNIZ

The ARCHIVE FOR RATIONAL MECHANICS AND ANALYSIS nourishes the discipline of mechanics as a deductive, mathematical science in the classical tradition and promotes pure analysis, particularly in contexts of application. Its purpose is to give rapid and full publication to researches of exceptional moment, depth, and permanence.

Each memoir must meet a standard of rigor set by the best work in its field. Contributions must consist largely of original research; on occasion, an expository paper may be invited.

English, French, German, Italian, and Latin are the languages of the Archive. Authors are urged to write clearly and well, avoiding an excessively condensed or crabbed style. The editors reserve the right to return to authors manuscripts found deficient in style, form, or clarity.

Manuscripts intended for the Archive should be submitted to an appropriate member of the Editorial Board.

CONTENTS OF VOLUME 75

ACKER, A., Interior Free Boundary Problems for the Laplace Equation . 157

ANDERSON, I.M., The Principle of Minimal Gravitational Coupling . . . 349

BELL, J.F., A Physical Basis for Continuum Theories of Finite Strain Plasticity: Part II 103

BREZIS, H., & L. VERON, Removable Singularities for Some Nonlinear Elliptic Equations 1

CAPRIZ, G., & P. PODIO-GUIDUGLI, Materials with Spherical Structure . 269

CHEN, K.-T., The Euler Operator 175

DAY, W.A., Synchronous Tractions which Produce Unbounded Kinetic Energy or Unbounded Stress 203

FIFE, P.C., & J.B. MCLEOD, A Phase Plane Discussion of Convergence to Travelling Fronts for Nonlinear Diffusion 281

GEYMONAT, G., & E. SANCHEZ-PALENCIA, On the Vanishing Viscosity Limit for Acoustic Phenomena in a Bounded Region 257

GLASNER, M., & M. NAKAI, Images of Reduction Operators 387

GOLUBITSKY, M.A., see SCHAEFFER, D.G. 315

HORNDESKI, G.W., Gauge Invariance and Charge Conservation in Non-Abelian Gauge Theories 211

HORNDESKI, G.W., Conservation of Charge and Second-Order Gauge-Tensor Field Theories 229

IANNECE, D., A. ROMANO & G. STARITA, An Approach to Thermodynamics of Materials with Fading Memory 373

JOSEPH, D.D., Instability of the Rest State of Fluids of Arbitrary Grade Greater than One 251

KITAMURA, Y., & T. KUSANO, Oscillation Criteria for Semilinear Metaharmonic Equations in Exterior Domains 79

KNERR, B.F., Parabolic Interior Schauder Estimates by the Maximum Principle 51

KUSANO, T., see KITAMURA, Y. 79

LEWERENZ, F., Eine Bemerkung zu den Marx-Schiffmanschen Minimalvektoren bei Polygonen 199

MCLEOD, J.B., see FIFE, P.C. 281

MORGAN, F., A Smooth Curve in R^3 Bounding a Continuum of Minimal Manifolds 193

NAKAI, M., see GLASNER, M. 387

PALMER, J., Complex Structures and External Fields 31

PODIO-GUIDUGLI, P., see CAPRIZ, G. 269

PRASAD, M., see SHANKAR, R. 169

REILLY, R.C., Geometric Applications of the Solvability of Neumann Problems on a Riemannian Manifold 23

ROMANO, A., see IANNECE, D., *et al.* 373

SANCHEZ-PALENCIA, E., see GEYMONAT, G. 257

SCHAEFER, D.G., & M.A. GOLUBITSKY, Bifurcation Analysis near a Double Eigenvalue of a Model Chemical Reaction 315

SCHMINCKE, U.-W., The Lower Spectrum of Schrödinger Operators . . 147

SHANKAR, R., & M. PRASAD, On the Non-Uniform Propagation of Weak Discontinuities in Magnetogasdynamics 169

SPERB, R.P., Growth Estimates in Diffusion-Reaction Problems 127

STARITA, G., see IANNECE, D., *et al.* 373

STRANG, G., see TEMAM, R. 7

TAUSCH, E., The n-dimensional Least Area Problem for Boundaries on a Convex Cone 407

TEMAM, R., & G. STRANG, Functions of Bounded Deformation 7

VERON, L., see BREZIS, H. 1

WEBB, G.F., An Age-dependent Epidemic Model with Spatial Diffusion . 91

WENTE, H.C., Large Solutions to the Volume Constrained Plateau Problem 59